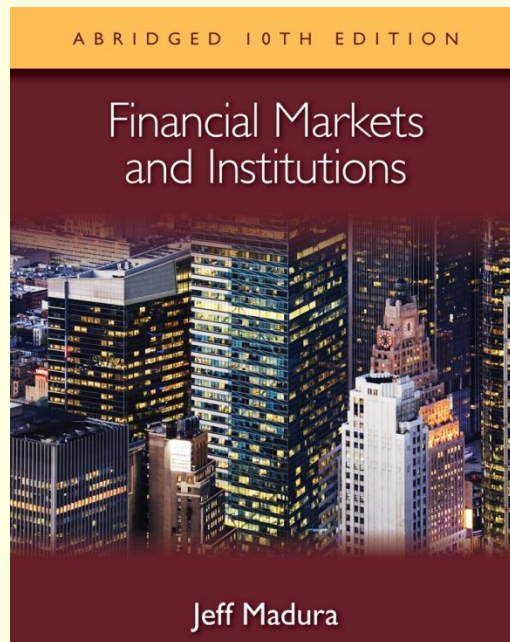


Financial Markets and Institutions

Abridged 10th Edition

by Jeff Madura



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11 Stock Valuation and Risk

Chapter Objectives

- explain methods of valuing stocks
- explain how to determine the required rate of return on stocks
- identify the factors that affect stock prices
- explain how to measure the risk of stocks
- explain the concept of stock market efficiency

Stock Valuation Methods

The Price-Earnings (PE) Method applies the mean price-earnings (PE) ratio based on expected earnings of all traded competitors to the firm's expected earnings for the next year

$$\text{Valuation} = \text{Expected earnings per share} \times \text{Mean industry PE ratio}$$

- Assumes future earnings are an important determinant of a firm's value
- Assumes that the growth in earnings in future years will be similar to that of the industry

Stock Valuation Methods

Price-Earnings Method:

■ Reasons for Different Valuations

- Investors may use different forecasts for the firm's earnings or the mean industry earnings over the next year
- Investors disagree on the proper measure of earnings.

■ Limitations of the PE Method –

- May result in an inaccurate valuation of a firm if errors are made in forecasting the firm's future earnings or in choosing the industry composite used to derive the PE ratio.

Dividend Discount Model

$$P = \sum_{t=1}^{\infty} \frac{D_t}{(1+k)^t}$$

where t = period

D_t = dividend in period t

k = discount rate

Stock Valuation Methods

Dividend Discount Model

■ Relationship with PE Ratio for Valuing

- The PE multiple is influenced by the required rate of return and the expected growth rate of competitors
- The inverse relationship between rate of return and value exists in both models
- The positive relationship between required rate of return and value exists in both models

■ Limitations of the Dividend Discount Model

- Errors can be made in determining the dividend to be paid, the growth rate, and the required rate of return
- Errors are more pronounced for firms that retain most of their earnings.

Stock Valuation Methods

Adjusted Dividend Discount Model

- The dividend discount model can be adapted to assess the value of any firm, even those that retain most or all of their earnings.
 - The value of the stock is equal to the present value of the future dividends *plus* the present value of the forecasted
- **Limitations of the Adjusted Dividend Discount Model:**
May be inaccurate if errors are made in:
 - deriving the present value of dividends over the investment horizon or
 - the present value of the forecasted price at which the stock can be sold at the end of the investment horizon.

Free Cash Flow Model

- For firms that do not pay dividends:
 - estimate the free cash flows that will result from operations.
 - subtract existing liabilities to determine the value of the firm.
 - divide the value of the firm by the number of shares to derive a value per share.
- **Limitations** - difficulty of obtaining an accurate estimate of free cash flow per period.

Required Rate of Return on Stocks

Capital Asset Pricing Model

- Sometimes used to estimate the **required rate of return** for any firm with publicly traded stock.
- The only important risk of a firm is **systematic risk**.
- Suggests that the return of a stock (R_j) is influenced by the prevailing risk-free rate (R_f), the market return (R_m), and the beta (B_j):

$$R_j = R_f + B_j(R_m - R_f)$$

where B_j is measured as the covariance between R_j and R_m , which reflects the asset's sensitivity to general stock market movements.

Required Rate of Return on Stocks

Capital Asset Pricing Model (Cont.)

■ Estimating the **Market Risk Premium**

- The yield on newly issued Treasury bonds is commonly used as a proxy for the risk-free rate.
- The term, $(R_m - R_f)$, is the market risk premium: the return of the market in excess of the risk-free rate.
- Historical data for 30 or more years can be used to determine the average market risk premium over time.

■ **Estimating the Firm's Beta** - typically measured by applying regression analysis to determine the sensitivity of the asset's return to the market return based on monthly or quarterly data.

Required Rate of Return on Stocks

Capital Asset Pricing Model (Cont.)

■ Application of the CAPM

- Given the risk-free rate as well as estimates of the firm's beta and the market risk premium, it is possible to estimate the required rate of return from investing in the firm's stock.
- At any given time, the required rates of return estimated by the CAPM will vary across stocks because of differences in their risk premiums, which are due to differences in their systematic risk (as measured by beta). Historical data for 30 or more years can be used to determine the average market risk premium over time.

Factors that Affect Stock Prices

Economic Factors

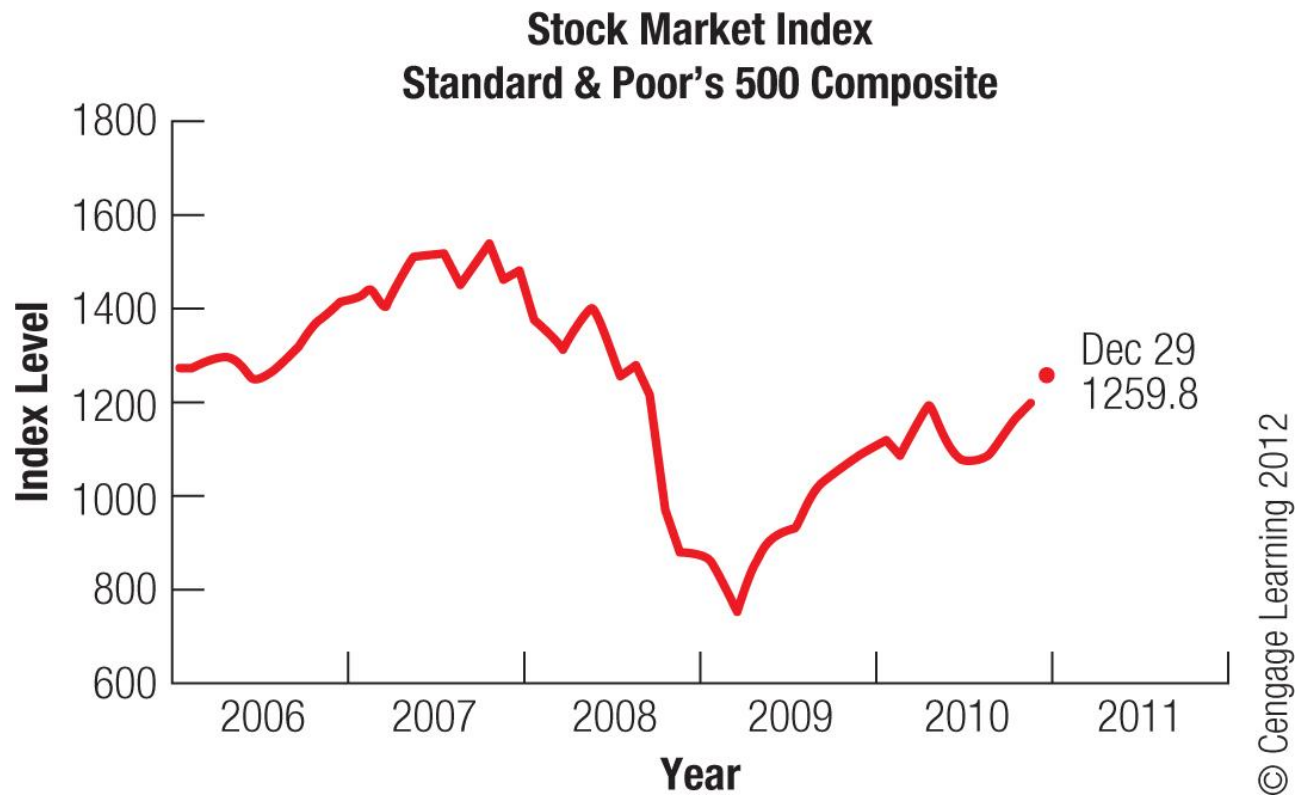
■ Impact of Economic Growth

- An increase in economic growth is expected to increase the demand for products and services produced by firms and thereby increase a firm's cash flows and valuation.

■ Impact of Interest Rates

- Given a choice of risk-free Treasury securities or stocks, investors should purchase stocks only if they are appropriately priced to reflect a sufficiently high expected return above the risk-free rate.
- Interest rates commonly rise in response to an increase in economic growth.

Exhibit 11.1 Stock Market Trend Based on the S&P 500 Index



Source: Federal Reserve.

Factors that Affect Stock Prices

Economic Factors (Cont.)

■ Impact of the Dollar's Exchange Rate Value

- Foreign investors prefer to purchase U.S. stocks when the dollar is weak and to sell them when the dollar is near its peak.
- Stock prices are also affected by the impact of the dollar's changing value on cash flows.
- Stock prices of U.S. companies may also be affected by exchange rates if stock market participants measure performance by reported earnings.
- The changing value of the dollar can also affect stock prices by affecting expectations of economic factors that influence the firm's performance.

Factors that Affect Stock Prices

Market-Related Factors

■ Investor Sentiment

- Represents the general mood of investors in the stock market.

■ January Effect

- Portfolio managers prefer investing in riskier, small stocks at the beginning of the year and then shifting to larger, more stable companies near the end of the year in order to lock in their gains.
- This tendency places upward pressure on small stocks in January each year.

Factors that Affect Stock Prices

Firm-Specific Factors

■ Change in Dividend Policy

- An increase in dividends may reflect the firm's expectation that it can more easily afford to pay dividends.

■ Earnings Surprises

- When a firm's announced earnings are higher than expected, some investors raise their estimates of the firm's future cash flows and hence revalue its stock upward.

Factors that Affect Stock Prices

Firm-Specific Factors (Cont.)

■ Acquisitions and Divestitures

- The expected acquisition of a firm typically results in an increased demand for the target's stock, which raises its price.

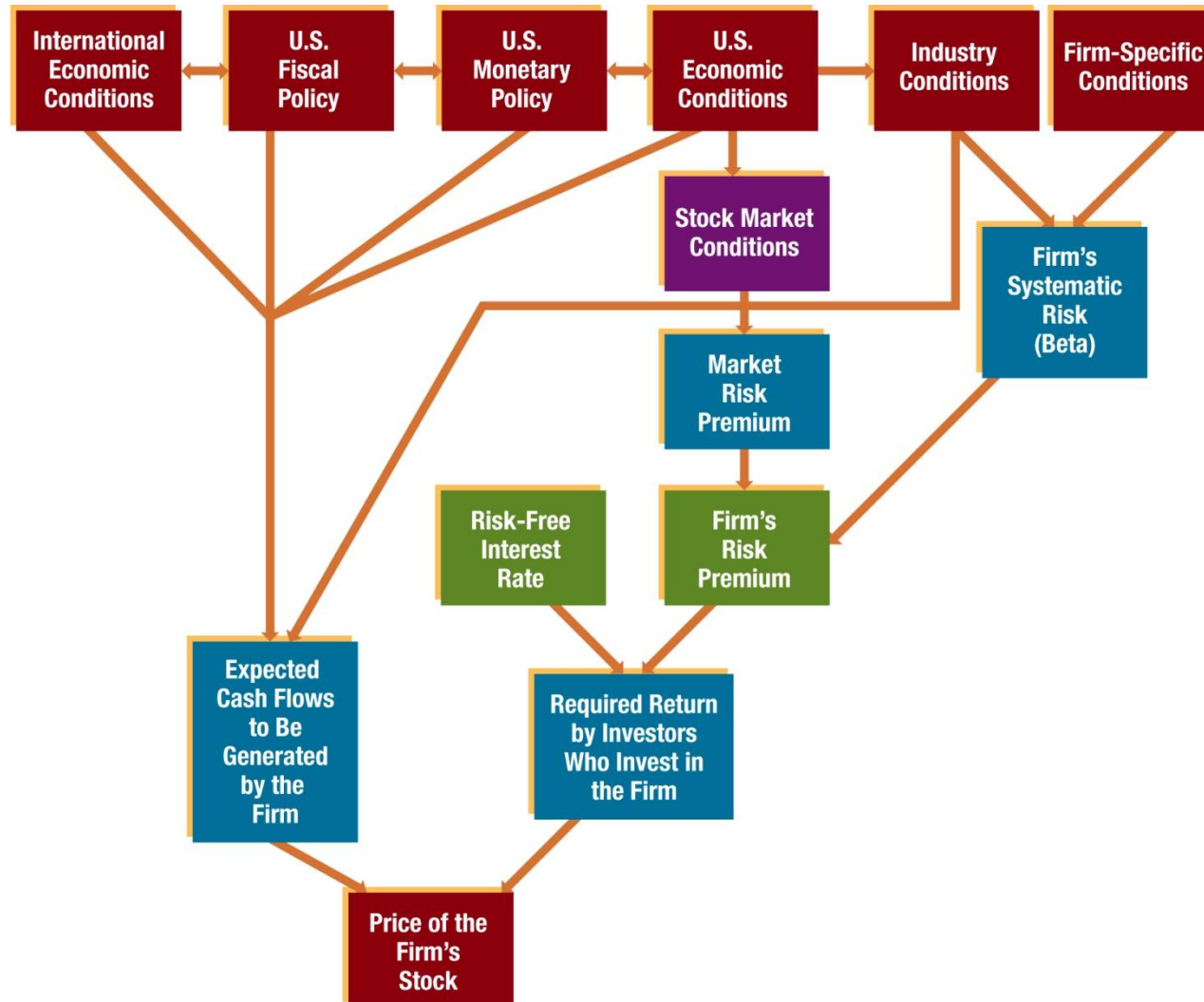
■ Expectations

- Attempting to anticipate new policies so that they can make their move in the market before other investors.

Integration of Factors Affecting Stock Prices

- Whenever indicators signal the expectation of higher interest rates, there is upward pressure on the required return by investors and downward pressure on a firm's value.

Exhibit 11.2 Framework for Explaining Changes in a Firm's Stock Price over Time



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Stock Risk

The return from investing in stock over a particular period is measured as

$$R = \frac{(SP - INV) + D}{INV}$$

where INV = initial investment

D = dividend

SP = selling price of the stock

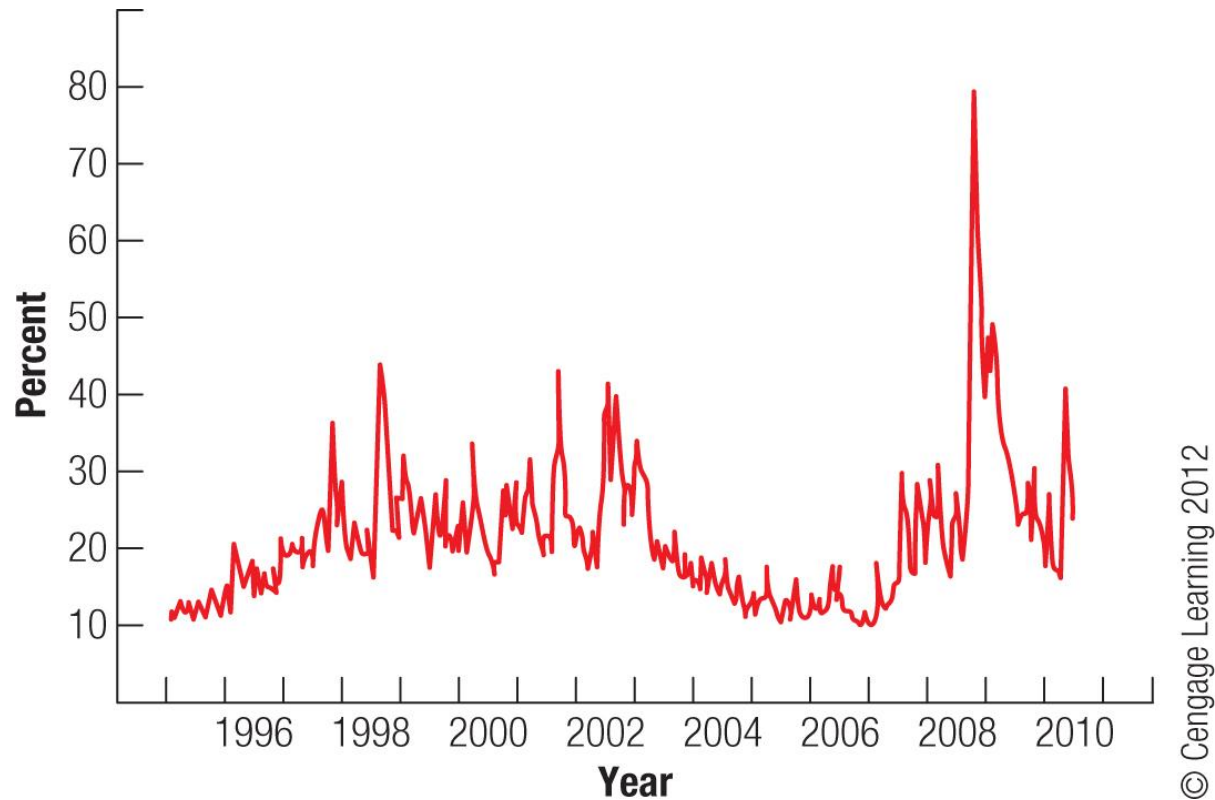
The risk of a stock can be measured by using its price volatility, its beta, and the value-at-risk method.

Volatility of a Stock or *total risk* serves as a measure of risk because it may indicate the degree of uncertainty surrounding the stock's future returns.

■ Forecasting Stock Price Volatility

- Using the historical method: a historical period is used to derive a stock's standard deviation of returns, and that estimate is then used as the forecast over the future.

Exhibit 11.3 Implied Volatility Index for U.S. Stocks over Time



Source: Federal Reserve.

Volatility of a Stock (Cont.)

Volatility of a Stock Portfolio - The portfolio's volatility can be measured by the standard deviation:

$$\sigma_p = \sqrt{w_i^2 \sigma_i^2 + w_j^2 \sigma_j^2 + \sum_{i=1}^n \sum_{j=1}^n w_i w_j \sigma_i \sigma_j CORR_{ij}}$$

where

σ_i = standard deviation of returns of the i th stock

σ_j = standard deviation of returns of the j th stock

$CORR_{ij}$ = correlation coefficient between the i th and j th stocks

w_i = proportion of funds invested in the i th stock

w_j = proportion of funds invested in the j th stock

Beta of a Stock - measures the sensitivity of its returns to market

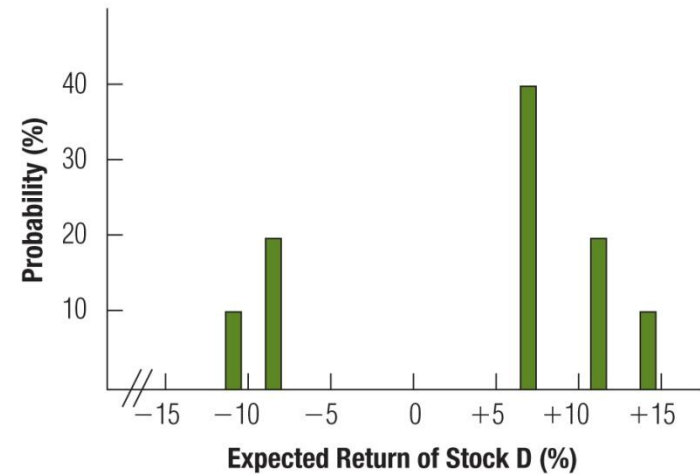
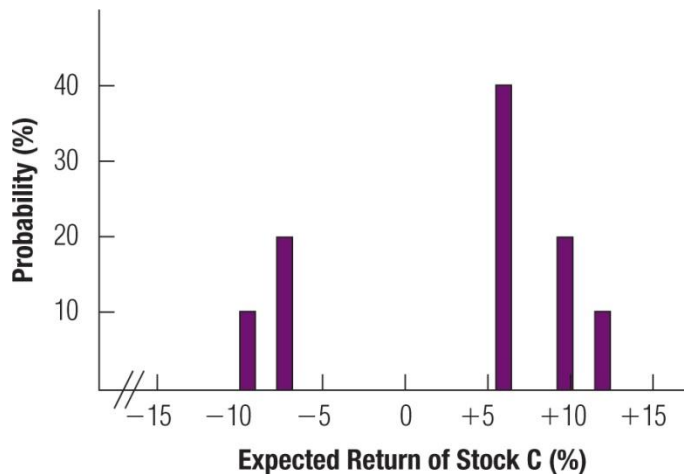
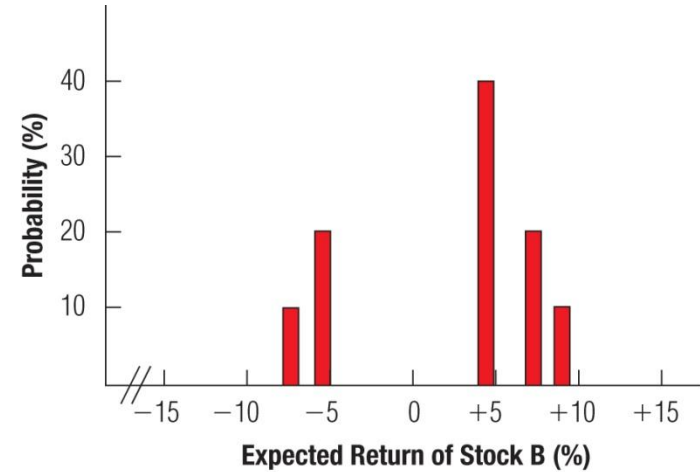
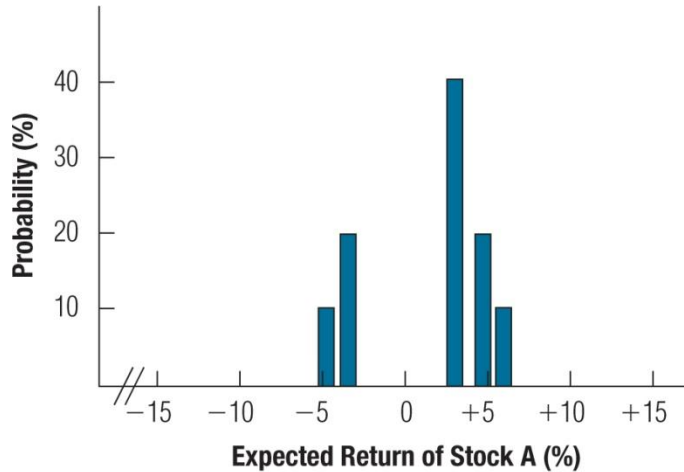
Returns

- Beta of a Stock Portfolio can be measured as the weighted average of the betas of stocks that make up the portfolio

$$\beta_p = \sum w_i \beta_i$$

- High-beta stocks are expected to be relatively volatile because they are more sensitive to market returns over time. Likewise, low-beta stocks are expected to be less volatile because they are less responsive to market returns.

Exhibit 11.4 How Beta Influences Probability Distributions



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Value at Risk

- estimates the largest expected loss to a particular investment position for a specified confidence level.
- Is intended to warn investors about the potential maximum loss that could occur
- Is commonly used to estimate the risk of a portfolio

Value at Risk -

■ Application Using Historical Returns

- E.g. an investor may determine that out of the last trading 100 trading days, a stock experienced a decline of greater than 7 percent on 5 different days.
- The investor could infer a maximum daily loss of no more than 7 percent for that stock based on a 95 percent confidence level.

Value at Risk

- **Application Using the Standard Deviation**
 - measure the standard deviation of daily returns over the previous period
 - then apply it to derive boundaries for a specific confidence level.

Value at Risk

- **Application Using Beta** - A third method of estimating the maximum expected loss for a given confidence level is to apply the stock's beta.
- **Deriving the Maximum Dollar Loss** - Once the maximum percentage loss for a given confidence level is determined, it can be applied to derive the maximum dollar loss of a particular investment.

Value at Risk (Cont.)

- **Application to a Stock Portfolio** - The three methods can be used derive the maximum expected loss of a stock portfolio for a given confidence level.
- **Adjusting the Investment Horizon Desired** – The same methods can be applied over a week or a month
- **Adjusting the Length of the Historical Period** - If conditions have changed such that only the most recent days reflect the general state of market conditions, then those days should be used..
- **Limitations of the Value-at-Risk Method** - Portfolio managers may be using a relatively calm historical period when assessing possible future risk.

Risk-Adjusted Stock Performance

Sharpe Index

The reward-to-variability ratio, or Sharpe Index, measures risk-adjusted returns when **total variability** is the most appropriate measure of risk.

$$\text{Sharpe Index} = \frac{\overline{R} - \overline{R}_f}{\sigma}$$

where \overline{R} = average return on the stock

\overline{R}_f = average risk - free rate

σ = standard deviation of the stock's return

This index measures the excess return above the risk-free rate per unit of risk.

Risk-Adjusted Stock Performance

Treynor Index

The Treynor Index measures risk-adjusted returns when **beta** is the most appropriate measure of risk.

$$\text{Treynor Index} = \frac{\overline{R} - \overline{R}_f}{\beta}$$

where \overline{R} = average return on the stock

\overline{R}_f = average risk - free rate

β = stock's beta

Stock Market Efficiency

Forms of Efficiency

- **Weak-Form Efficiency** - suggests that security prices reflect all market-related information, such as historical security price movements and volume of securities trades.
- **Semistrong-Form Efficiency** - suggests that security prices fully reflect all public information, such as firm announcements, economic news, or political news.
- **Strong-Form Efficiency** - suggests that security prices fully reflect all information, including private or insider information.

Tests of the Efficient Market Hypothesis

- **Test of Weak-Form Efficiency** - Weak-form efficiency has been tested by searching for a nonrandom pattern in security prices.
- **Test of Semistrong-Form Efficiency** - Semistrong-form efficiency has been tested by assessing how security returns adjust to particular announcements.
- **Test of Strong-Form Efficiency** - Tests of strong-form efficiency are difficult because the inside information used is not publicly available and cannot be properly tested.

Foreign Stock Valuation and Performance

Valuation of Foreign Stocks

■ Price–Earnings Method

- The expected earnings per share are multiplied by the PE ratio (based on the firm's risk and local industry) to determine the price of the stock.
- The PE ratio for an industry may change, especially when the industry consists of few firms.
- The value derived by this method is denominated in the local foreign currency .

■ Dividend Discount Model - can be applied by discounting the stream of expected dividends while adjusting to account for expected exchange rate movements.

Foreign Stock Valuation and Performance

International Market Efficiency

Some foreign markets are likely to be inefficient because a small number of analysts and portfolio managers may monitor the stocks.

Measuring Performance from Investing in Foreign Stocks

The returns from investing in foreign stocks is most properly measured in terms of the investor's objectives.

Foreign Stock Valuation and Performance

Performance from Global Diversification

Research has demonstrated that investors in stocks can benefit by diversifying internationally.

Diversification among Emerging Stock Markets:

The correlation between stocks of different countries is low, so investors can reduce risk by including some stocks from these markets in their portfolios.

SUMMARY

- Stocks are commonly valued using the price–earnings (PE) method, the dividend discount model, or the free cash flow model. The PE method applies the industry PE ratio to the firm’s earnings to derive its value. The dividend discount model estimates the value as the present value of expected future dividends. The free cash flow model is based on the present value of future cash flows.
- When applying the free cash flow model to value a stock, a required rate of return must be estimated. One method of estimating the required rate of return is to apply the capital asset pricing model, in which the required return depends on the riskfree interest rate and the firm’s beta.

SUMMARY(Cont.)

- Stock prices are affected by those factors that affect future cash flows or the required rate of return by investors. Economic conditions, market conditions, and firm-specific conditions can affect a firm's cash flows or the required rate of return.
- The risk of a stock is measured by its volatility, its beta, or its value-at-risk estimate. Investors are giving more attention to risk measurement in light of abrupt downturns in the prices of some stocks in recent years.

SUMMARY(Cont.)

- Stock market efficiency implies that stock prices reflect all available information. Weak-form efficiency suggests that security prices reflect all trade-related information, such as historical security price movements and the volume of securities trades. Semistrong-form efficiency suggests that security prices fully reflect all public information. Strong-form efficiency suggests that security prices fully reflect all information, including private or insider information. Evidence supports weak-form efficiency to a degree, but there is less support for semistrong or strong-form efficiency.